

Non-Vaccine Interventions to Prevent SARS and other Respiratory Diseases in Initial Entry Training

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Abstract

Introduction: As of 30 April 2003, the epidemic of Severe Acute Respiratory Syndrome (SARS), which originated in southern China in February of this year, has not impacted military initial entry training. Traditionally, acute respiratory disease (ARD) agents have constituted a significant cause of morbidity at military training centers and no vaccines are available at this time to protect against SARS as well as other viral and bacterial respiratory pathogens.

Methods: We reviewed literature and selected study/investigation reports on non-vaccine ARD interventions (NOVARDIs) which included personal hygiene and personal protection, administrative controls, engineering/environmental controls, medications and nutritional supplements. Population-based studies were reviewed in detail to evaluate effectiveness of NOVARDIs.

Results: Most of the literature addressed theory with some laboratory findings, anecdotes and uncontrolled comparisons. There are very few well-designed, controlled, population-based studies. Data from World War I and II revealed an inverse relationship between living space per soldier and ARD rates; studies and outbreak investigations in the past 40 years have also demonstrated clustering of cases within smaller (eg, company-sized) training units. Only frequent handwashing (more than 3 times a day) and antimicrobial wipe use have been noted to decrease ARD rates (by 45%) and ARD-associated clinic visits (by 33-40%) among US Navy and Air Force recruits, respectively.

Conclusion: The effectiveness of NOVARDIs is poorly addressed in written reports and some interventions may be impractical. Increasing living space, more effective isolation/cohorting of training units and stricter hand hygiene

Introduction

- The WHO (as of 17 May 03) reports 7761 probable SARS cases with 623 deaths
- Countries with highest number of cases: China, Hong Kong, Taiwan
- 66 Cumulative Cases (as of 17 May 03) in the U.S.
- No local transmission in the U.S.

Respiratory Disease and IET

- No cases of SARS reported in IET
- Other Acute Respiratory Diseases (ARDs) have always been a concern for the Military and for recruit training
- Vaccines are available for some, but not all respiratory diseases
- We conducted a literature review of Non-Vaccine ARD Interventions (NOVARDI)

Epidemiologic Triangle and NOVARDIs

Agent



Host

Hand hygiene
Masks
Medications
Nutritional Supplements

Environment

Adequate sleeping space
Cohorting
Engineering Controls
- Ventilation
- Air Sterilization

Handwashing

- Proven effective for nosocomial and enteric infections but less proof for ARDs.
- Navy Recruit Study: Operation “Stop Cough”
 - Mandatory 5x daily handwashing
 - Education on handwashing for recruits and trainers
 - Mandatory liquid soap in barracks
 - “Wet sink” policy in barracks
 - Hygiene as part of inspections
 - 45% Decrease in ARD rates in trainees compared to previous years
- Recommended by CDC for contact with suspected SARS patients and for protection for general public

Hand Sanitizers

- Alcohol-based Hand rubs recommended by CDC in healthcare settings if hands are not visibly soiled
- Hand rubs may be more effective against some microorganisms than traditional handwashing
- Recommended by CDC for contact with suspected SARS patients and for protection for general public

Antimicrobial Handwipes

- Not recommended by CDC in healthcare settings
- Air Force Recruit studies
 - 33% reduction in sick call visits for URI among USAF squadrons using wipes with (parachlorometaxylenol (PCMX)). Visits for sore throat were reduced by 40%.
 - Recent unpublished study: PCMX wipes more effective than alcohol based rubs or handwashing
- No recommendations on Handwipes by CDC for SARS

Masks

- Recommended by CDC for TB Control :
 - Surgical Masks for patients with TB
 - N-95 Particulate Masks for those in contact with patient
- Evidence of “real world” effectiveness is lacking
- Impractical for sustained use in many cases
- CDC SARS Recommendations:
 - Surgical Masks for suspect SARS patients
 - N-95 Particulate Masks for those in contact with patient
- CDC does not recommend routine use of surgical masks when people are in public to prevent SARS

Administrative Controls

- Minimum Space Requirements for Bunks
 - Currently, AR 40-5 requires 72 sq. ft of net floor space (bed, locker but excludes lounges, bathrooms, general circulation, halls and stairwells) per recruit.
 - The basis for AR 40-5 goes back to influenza attack rates in troops in barracks observed in World War I.
 - Space Requirements were not based on scientific data but on professional judgment

Administrative Controls

- Sleeping head-to-toe
 - This consists of sleeping troops in a line of bunks alternating head and foot positions
 - Currently practiced at training sites, no strong proof of efficacy
 - These methods are based on the assumption, which may be doubted, that transfer of respiratory infections occurs primarily in the barracks
- No CDC recommendations regarding SARS

Administrative Controls

- Cohorting (Type 1)
 - Separating/isolating those with ARD symptoms
 - Already done to some extent, those with ARD symptoms are sent to infirmary
 - Generally may not be effective: Individuals usually contagious before symptoms (not known for SARS)
 - For SARS:
 - Isolation of Sick Individuals
 - Quarantine of Well Individuals presumed exposed

Administrative Controls

- Cohorting (Type 2)
 - Preventing Units from mixing/interacting
 - Most contact now is within companies
 - Mixing with other companies in dining facilities
 - Further cohorting will require change in training facilities
 - No recommendations from CDC

Ventilation Control

- The theory is that is that barracks that are adequately ventilated with fresh (clean) air will lead to dilution of airborne contaminants (i.e. unpleasant odors) as well as a decrease in the concentration of airborne microorganisms and dust.
- 1998 JAMA: Brundage et. al.
 - Modern sealed energy efficient “Starship” barracks had higher ARD rates than drafty WWII barracks
- Current ventilation standards based on comfort
- No controlled studies on effect of ARDs
- No CDC recommendations regarding SARS

Ventilation Filters

- High Efficiency Particulate (HEPA) Filters recommended by CDC to augment other engineering controls for TB patients
- Non-HEPA Ventilation Filters – No controlled studies
- No CDC recommendations regarding SARS

Engineering/Sanitation Controls (cont.)

- Ultraviolet (UV) Sterilization of Air and Glycol Vapor Sterilization of Air
 - In the 1940's researcher found slight efficacy of both ultraviolet or glycol vapor sterilization of the air for ARDs, but was determined to be impractical.
 - Only the facilities with the highest-risk-for-severe respiratory diseases consider UV air sterilization as practical (eg. TB isolation wards).
 - Recent Navy Study: No appreciable benefit; lights are very expensive
- No CDC recommendations regarding SARS

Engineering/Environmental Controls (cont.)

- Dust Control
 - The concept is that the routine cleaning of floors in troop housing (barracks) areas reduces the amount of airborne dust and associated resuspension of inhalable viral particles for training personnel.
 - Done in the 40's and 50's: Oiling of Blankets and Floors: not efficacious
- No CDC recommendations regarding SARS

Antibiotic/Antiviral Medications

- Benzathine Penicillin (BPG)
 - Used since 1953 to reduce incidence of streptococcal disease and its complications.
 - BPG has not been recommended for the prevention of ARD secondary to non-rheumatogenic streptococci.
 - Other penicillin-sensitive nonstreptococcal organisms that cause epidemic ARD have not been recognized.
 - The use of antibiotics may be beneficial in the prevention of other non-streptococcal causes of ARDs, but this has not been studied.
 - Wide use of many different antibiotics may be risky in the possible cultivation of resistant organisms.
- No CDC recommendations regarding SARS

Antibiotic/Antiviral Medications

- Amantadine, Rimantadine
- Zanamivir and oral Oseltamivir
 - Well-controlled clinical studies have shown the prophylactic benefits of the above antivirals in the prevention of influenza
 - The antivirals have also been shown to decrease the length of illness when given early in the disease.
 - The above are NOVARDIs are specific only for prevention of influenza ARDs.
- No CDC recommendations regarding SARS

Nutritional Supplements

- Zinc, Vitamins C, Echinacea
 - Most studies focused on the prevention of the common cold
 - Overall, studies on the preventive and therapeutic effects of the above substances are inconsistent.
 - Some studies show a variable reduction in the duration of symptoms, but few demonstrate prophylactic effects.
 - Echinacea shows some preventive effects but not enough evidence to recommend specific Echinacea product or preparation
- No CDC recommendations regarding SARS

Other Possible SARS Strategies

- Screening of recruits for fevers and then isolating the febrile pending further development of disease
- Screening recruits based on travel history
- Others?

NOVARDI

Recommendations

- Encourage handwashing or hand sanitizers
- Provide adequate bed spacing
- Arrange beds in “Head-to-toe” sleeping configuration
- Maintain Ventilation to ensure current engineering/building design standards
- Continue policy for BPG to reduce incidence of streptococcal disease when necessary
- Additional possible SARS Interventions
 - Screening for symptomatic recruits
 - Screening by potential exposure (travel)
 - Others?

Potential Research Topics

- Validate effect of hand hygiene
- Quantify the effect of bed spacing/
crowding/effect of summer surge
- Determine importance of
ventilation on ARD rates

Questions?